INDEX TO VOL. III.

GENERAL.

ABEL, Professor, and the manufacture of dynamite, 168
Abuse of Evolution, 104
Academy, the, and the KNOWLEDGE library series, 79
Accumulators, or secondary batteries, 248
Acoustic experiment, 90
Ady, John Ernest, the great international fisheries exhibition, 319, 337; natural history department (illustrated), 354, 389
Age of the Missouri, 327
Allen, Grant, a naturalist's year, winter heliotrope, 20; gorse blossoms, 49; the peewit cries, 81; willow catkins, 112; snow-drop and snow-flake, 143; char jump, 175; ptarmigan, the, 203; the marsh marigold, 231; a geological excursion, 259; two little greenish flowers, 276; the blackcap sings, 303; among the grasses, 336; concerning bats, 367
Amateur electrician, the, electrical measurement (illustrated), 70, 102, 206, 238; the batteries, 323
America and protective tariffs, 215
Ancient bird tracks, 2
Annual summary of the Registrar-General, 329
Anonymuncule, use of the word by Charles Reade, 392
Answers to correspondents, 79
Antique water conduit at Posilippo, 32
Aqueduct of Betilienus at Altari, 31
Archæological discoveries in Mexico, 120
Archer Fish, the (illustrated), 280
Artistic and Literary Correspondence Society, 313
Astronomy, some books on (review), 56
Aurora, electrical nature of, 96; periods of the, 207
Australia, flying foxes in, 279
Australian ants, 373
Australian artesian wells, 96
Austrian Government sanitary council and life-saving on railways, 109
Automatic clock at the Stock Exchange, 174
BABYLONIA and Assyria, libraries of, 131, 307
Baldness, 309
Ballet-dancers and the electric light, 64
Balloons as preventive of collisions at sea during fog, 230
Belladonna, optical effects of, 68
Bell, Sir Francis D., on the vitality of the people of New Zealand, 18
Bell Telephone, an improved, 243
Belt case, the, 3
Bessemer steel, statistics of, 142
Bête, remarks on the gender of, 392
Birds, hovering of, 96; in cold weather, 131
Birmingham, new railway station at, 174
Birth and growth of myth, 19, 51, 83, 129, 159, 234, 273, 320, 352, 387
Bishop, Mr. Irving, and thought-reading wagers, 377
Bishop Wilberforce and his nickname, 18
Blasphemous libel, the law of, 156
Bodies, our, muscles, 8; life and work, 39; skull and spine (illustrated), 67; the trunk and the limbs, 115; the processes and functions of the body, 144; how the body's duties are performed, 178; absorption and blood repair, 204; the blood, 236; the circulation of the blood, 260; the income and expenditure of the body, 306
Bog, a moving, 80
Bombay hunt, the, and the Egyptian war, 2
Borelly, M., discovery of a minor planet by, 298
Bread and honey, 135
Brightness, laws of, 304, 324, 340, 372
Brighton Aquarium, the dolphin at the, 360
Brighton, Mr. Proctor's lectures at, 173
British Workman, the, on temperance, 362
Browning, John, novelties in tricycles, 71; bicycles and tricycles for 1883, 93, 130, 176; two-speed gearings, 205; how to use our eyes, 111, 149; complementary colours, 161, (illustrated) 193, 261; on a toy tricycle, 290; social tricycles, 368
Brünn, the model theatre at, 230
Brush dynamo-electric machine (illustrated), 295
Butterfly in winter, 18, 150
Buying power of gold, 288
CALIFORNIA tree, a, 2
Cambridge and Oxford boat-race, the, 173
Canon Farrar and astrology, 18
Carte, Mr. D'Oyley, and easy egress to theatres, 18
Cattle, imports of, 142
Central telegraph office, the, 220
Chalk-boring at Southampton, 80
Chemistry of cookery, the, 33; the boiling of water, 65; cooking under water, 97, 128, 158, 191, 218, 246, 274, 308, (illustrated) 341, 370
Chess, regarded as a home game, 363; remarks on the international tournament, 363
Chess Column:—game played in Sussex championship tournament, 1883, 94; game played between Messrs. Hoon and Tarrant, 124; what constitutes a strong player, 139; chess players usually distinguished for general mental ability, 186; Oxford *v.* Cambridge, 186; end game from actual play, 200; Edgar Allan Poe on chess players, 228; the international chess tournament, 242, 256, 271, 285, 301, 317, 333, 349, 365, 382, 397; the Vizyanagram tournament, 365; an international tournament in Germany, 397; see also 16, 29, 46, 61, 78, 108, 154, 171, 213
Chinese cabinet ministers and the comet, 31
Church of England Guild of St. Matthew, and blasphemous libel, 187
"Clerk" or "clark," 85
Clocks and watches (review), 164
Clodd, Edward, the birth and growth of myth, 19, 51, 83, 129, 159, 234, 273, 320, 352, 387
Coal output in Ohio, 47; coal-loading and the electric light, 155
Colliers, geology among the, 328
Collisions at sea during fog, 103; collisions and the Society of Arts, 230
Comet, the great, of 1882 (illustrated), 147, 160, 195; as observed in Tasmania, 243
Cometic collision with the sun, Professor Young on a, 79
Comets, tails of, 72, (illustrated) 100; Mr A. Davis on the formation of the tail, 239; see also 292
Comma, improper uses of the, 376
Commercial products of the sea (review), 361
Continental floods, effects of, 32
Cookery, the chemistry of, 33; the boiling of water, 65; cooking under water, 97, 128, 158, 191, 218, 246, 274, 308, (illustrated) 341, 370
Corpulence, 73, 87, 118
Corseted women, health of, 69
Cost of telegrams, 188
Cremation, 341
Crystal Palace district gas company, 142
Crystal Palace electric and gas exhibition, 84, (illustrated) 196; final notice, 264
DARWIN and a future state of existence, 17; his theory of ancestral derivation, 63
Death at the play, 297
Death of worlds, 263
Deep-sea fish, a new (illustrated), 250
Depopulation of the Highlands, 31
Dickens, Charles, and compositors' punctuation, 376
Discoveries at Tel-el-Maskhuta, 145
Divided skirt, the, 362
Dolphin at the Brighton Aquarium, 360
Dream of infinity, 262
Dynamite, account of, 173
EARTHSLIP near Fort de l'Ecluse, near Geneva, 48
Earth, sun-views of the (illustrated), 25, 53, 117, 180, 237, 310, 375, 390
Earth, the past of the (review), 344
Edison incandescent lamp, the, 95
Edison lamps in America and Europe, 142
Edison system in Paris, 216
Editorial gossip, remarks on, 293
Education, Professor Huxley on, 125
Edwards, Amelia B., was Rameses II. the Pharaoh of the oppression? Tel-el-Maskhuta *v.* the Raamses of the Bible, 21 (conclusion), 36; discoveries at Tel-el-Maskhuta, 145
Edwards, Miss, and the Pharaoh of the oppression, 17
Edwin Drood, *dénouement* of, 32
Egyptian exploration committee and Miss A. B. Edwards, 141
Electric illumination (review), 74
Electrician, the amateur, electrical measurement (illustrated), 70, 102, 206, 238; the batteries, 322
Electric light companies, 35; the effect of the light on plants, 110; the electric light (review), 378
Electrical experiments, 197; the electrical light in surgical diagnosis (illustrated), 281
Elementary teachers, blunders of, 202
Elements of weather-knowledge (review), 165
Elliott, G. W., the Warner observatory (illustrated), 232
Elm colliery, Flintshire, discovery of a spring of mineral oil at, 64
Elm-leaf beetle, hibernation of the, 110
Elphinstone and Vincent dynamo-machine, experiments with the, 197
Energy, 192
Engineering and metal trades' exhibition, the, 142
Engineering geology (review), 311
English sea-side health resorts, land and sea-winds, 247
Etchings of Mr. Whistler, 208
Etna, 142
European mineral waters (review), 345
Evolution, abuse of, 104; evolution of life (review), 119
Eyes (illustrated), how to use them, 111, 149; complementary colours, 161, (illustrated) 193, 261
FACE of the sky, Jan. 5 to Jan. 19, 11; Jan. 19 to Feb. 2, 42; Feb. 2 to Feb. 16, 75; Feb. 16 to March 2, 105; March 2 to March 16, 134; March 16 to March 30, 166; March 30 to April 13, 197; April 13 to April 27, 226; April 27 to May 11, 252; May 11 to May 25, 282; May 25 to June 8, 312; June 8 to June 22, 346; June 22 to July 6, 379
Faith, science as an aid to (review), 360
Fellowship of learned societies, 43
Ferns, where to find them (review), 311
Finns, the savage state of, 155
First cousin marriages, 357
Fish, a queer, 110; a new deep-sea species (illustrated), 250
Fisheries exhibition, the great international, 319; introductory, 337; natural history department (illustrated), 354, 389
Flying foxes in Australia, 279
Forestry, the Journal of, 244
Forests, waste of, 119
Foster, Thomas, a theory of Mercury, 12, 28; and home music, 157
Fothergill, Percival A., F.R.A.S., cremation, 341
Founding a town in one night, 64
Freeman, E. A., LL.D., "clerk" or "clark," 85
Freethinker prosecution, remarks on the, 156
Frost, its effects on stone, 1
Frostless winter, cost of a, 142
GALAXY, star-clouds in our, 351
Gastroscope, view of application of the (illustrated), 281
General Assembly Hall, Edinburgh, and its new lightning conductor, 229
Geological excursion, a, 259
Geology of the Isle of Man (illustrated), 277; a field geology (review), 311; among the colliers, 328
Gigantic birds of a remote geological period, 2
Glasgow Herald, the, and Mr. Proctor, 376
Gold in Victoria, 80; the buying power of, 288
Goschen, George J., the buying power of gold, 288
Great Britain, sun-views of (illustrated), 390
Great comet, the, of 1882, 127, (illustrated) 147, 160, (illustrated) 195
Great international fisheries exhibition, the, 319; (introductory), 337; natural history department (illustrated), 354, 389
Great Pyramid, review of Mr. Proctor's work on, 17; was the principal pyramid designed for a tomb? 392
Great sun spots, 54
Great telescope, a, 356
Greek, the study of, 344
Grensted, Fred. F., comets' tails, 72
Guidance for youth (review), 311
HAMPDEN, Mr., and his theory of the earth's flatness, 95, 151, (illustrated) 184; his denunciatory articles, 188; his treatment in KNOWLEDGE, 201
Harding, Martin J., butterflies in winter, 150
Harrison, W. Jerome, F.G.S., the geology of the Isle of Man (illustrated), 277
Haviland, Alfred, M.R.C.S., English seaside health resorts, land and sea winds, 247
Hawthorne, Mr. Julian, 32
Health of corseted women, 69
Health resorts, English seaside, land and sea winds, 247
Heavenly bodies, the (review), 361
Herbert Spencer in America, 97
Highlands, depopulation of, 31
Hogs, how they destroy pine forests, 47
Holborn Viaduct, the lighting of, 95
Holmes, Prof. Wendell, on his experiences as an author, 47
Home music, 157
Honey and bread, 135
House of Commons and the electric light, 215
Hovering of birds, 96

DEC 30 clerk

683973

XUM

General—*continued.*
How to use our eyes (illustrated), 111, 140; complementary colours, 161, (illustrated) 193, 261
Humanity and natural history, 5
Hungarian state railways, 325
Huxley, Professor, on education, 125
Hydrogen, means for separation of, from a mixture of gases 145
Impressions of America, by Mr. Herbert Spencer, 41
Infinity, a dream of, 262
Ink, formula for a good and cheap kind, 244
International chess tournament, observations on, 313
Iron, effect of, on the surface of the earth in connection with electricity, 174
Isaiah of Jerusalem, Mr. Matthew Arnold on, 202
Jago, William, F.C.S., our chemistry column (sea-salt), 353, 385
Jay Gould, Mr., and New York morality, 95
Jefferies, Richard, humanity and natural history, 5
Jupiter, the red spot on, 293
Kew Gardens, earlier opening of, 109
King, Mrs., on the divided skirt, 362
Knowledge, sonnet on, 2
Land junction proposed between Great Britain and Ireland, 392
Lantern readings (review), 378
Laws of brightness, 304, 324, 340, 372
Learning languages, 66; the Hamiltonian system, 99, 146, 176
Lecture experience, 31
Lecture notes, 25, 40
Lectures and the London papers, 217; neglect of, by the London press, 229
Lectures at Brighton by Mr. Richard A. Proctor, 173
Leicester, enthusiastic reception of Mr. Proctor at, 18
Leopold Shakespeare, the (review), 209
Lesseps, M. de, and the Sahara sea-scheme, 215
Levelling action of mountains, 79
Lewis, Dr. D., health of corseted women, 69
Libraries of Babylonia and Assyria, 131, 307
Library of English literature, 209
Life, evolution of (review), 119
Life-saving on railways, 109
Light (review), 10
Light given by a gas-flame, amount of, 174
Lighting the sides of steamships, 96
Lightning, curious effect of, 69
Limits of telescopes, 376
Liquids, on the spheroidal condition of, 257
Lockyer, Mr. Norman, and Knowledge, 229
Logical puzzle, a, 7, 26, 132, 198
Loisettian school of memory, 156
London fogs, composition of, 1
Loss by worn silver, 216
Love dances of a king lory, 96
Luck in chess, 313
Luminous paint, directions for making, 2
Lunar craters, imitations of the forms of, 110
Lunar lessons, 335
Magnetism, Professor Hughes on, 339
Marriage and the colour of women's hair, 330
Marriages of first cousins, 357
Mathematical Column:—notes on Euclid, 15, 28, 45; how to determine the attraction of a spherical shell on an external particle, 60; a pretty problem, 76; compound proportion, 93, 107; double rule of three, 93; easy lessons in the differential calculus, 169, 241; a mathematical letter, 138; absorption of light by air, 213; geometrical problems, introduction, 332; construction, 348; analysis and synthesis, 364, (illustrated) 381, 397; see also 270, 301, 316
May frosts and the moon, 296
Messier (crater in the moon), 294
Meteor, a strange, 64
Meteorological office, the weather forecasts of the, 336
Microbe of hen-cholera, 110
Microphone, ingenious experiment with the, 174
Microphonic action under the microscope, 230
Microscope, pleasant hours with the, disease germs, 7, 34, 82, 114, 163, 190, 219, 245, 288, (illustrated) 322, 358, 383
Middlesbrough, the electric light in, 31
Mineral oil spring, discovery of, in Flintshire, 64
Mineral waters (review), 345
Mines, respiration in, 216
Mistletoe, spelling of, 18, 32, 59
Missouri, age of the, 327
Monkey, intelligence of a, 109
Monotremes, remarks on, 64
Mont Credo, slipping of the sides of, 79
Moon, the, has it an atmosphere? 10; the moon and May frosts, 293; as seen through a three-inch telescope (illustrated), 222, 265, 294, 326, 390
Moving bog, a, 80
Moving dune, a, 126
Moving sand-hill, a, 63
Music for the home, 157
Myth, the birth and growth of, 19, 51, 83, 129, 159, 234, 273, 320, 352, 387
Nat, the naturalist (review), 10
National street railway association in America, 80
Natural laws, 189
Natural philosophy, treatise by Sir W. Thomson and Professor Tait, 244
Naturalist, year of a, winter heliotrope, 20; gorse blossoms, 49; the peewit cries, 81; snow-drop and snow-flake, 143; char-jump, 175; the ptarmigan, 203; the marsh marigold, 231; a geological excursion, 259; two little greenish flowers, 276; the blackcap sings, 303; among the grasses, 336 concerning bats, 367
Natural, the, in the spiritual (review), 312
New ship canal between the Baltic and the North Sea, 69
New skirt, the, 162, 230
Newspaper cuttings, subscribing for, 313
Newspaper science, 251
New York morality and Mr. Jay Gould, 95
Nights with a three-inch telescope (illustrated), 38; the moon in a, 222, 265, 294, 326, 390
Nitro-glycerine, its discovery, 173
Nobel, Alfred, and the origin of dynamite, 173
Noble, William, Saturn's rings, 118
Novelist, the value of the, 2
Oil, discovery of, in Flintshire, 64
Oldest tree in the world, the, 31
On a toy tricycle, 290
Optical effects of belladonna, 68
Optical experiment, an, 73
Organic chemistry (review), 345
Our bodies, muscles, 8; life and work, 39; skull and spine (illustrated), 67; the trunk and limbs, 115; the processes and functions of the body, 144; how the body's duties are performed, 178; absorption and blood repair, 204; the blood, 236; circulation of the blood, 260; the income and expenditure of the body, 306
Our chemistry column, sea salt, 353; the halogens, 385
Our food supply, dependence on foreign sources, 142
Oxy-hydrogen lantern, the use of, forbidden in the Brighton Pavilion, 376
Palmieri, Professor, and new process for silvering glass, 230
Paper-pulp rails as a substitute for steel, 188
Paper railway wheels, 95
Paradise fish, the (illustrated), 291
Paradox corner:—A theory of Mercury, 12, 28; is it possible to grow giants? 58; the solar system all equally illuminated by the sun, 92; flat earth *v.* globe, 154, (illustrated) 184, 198, 214
Paradoxers, strange ways of, 201
Paradoxical philosophy (review), 312
Paraffine in basaltic rock, 216
Parasites in the human body, 156
Past, the, of our earth (review), 344
Peace-offering, a, 189
Penny readings, poems for (review), 345
Periods of the aurora, 207
Personal, 287
Petroleum in the Argentine Republic, 230
Phosphorus bronze as a conductor of electricity, 63
Photographing the solar corona, 4
Phylloxera, a remedy for, 31
Physical optics (review), 10
"Pickwick" in phonographic shorthand, 244
Plants, effects of electric light on, 110
Pleasant hours with the microscope, disease germs, 7, 34, 82, 114, 163, 190, 219, 245, 288, (illustrated) 322, 358, 383
Pneumatic tubes at Philadelphia, 80
Poems for penny readings (review), 345
Popular astronomy (review), 225
Practical geometry (review), 266
Prayer and weather, 177
Prayers, profanity of some, 125
Preece, Mr. W. H., on electrical exhibitions, 1
Prevost, Dr., bread and honey, 135
Pritchard, the Rev. Charles, and the study of Greek, 344
Proctor, Richard A., the Belt case, 3; a logical puzzle, 7, 132; notes on Euclid, 15, 45; sun-views of the earth (illustrated), 24, 55, 117, 180, 237, 310, 375; lecture notes, 25, 40; stays and strength, 50, 85; some books on astronomy, 56; Sydney and Sunday lecturing, 57; learning languages, 66; the Hamiltonian system, 99, 146, 176; study of logic, 71; the vast and the minute (review), 88; double rule of three, 93; collision at sea during fog, 103; the abuse of evolution, 104; clocks and watches (review), 164; easy lessons in the differential calculus, 169, 241; prayer and weather, 177; natural laws, a peace-offering, 189; sun-worship, 204; absorption of light by air, 213; lectures and the London papers, 217; popular astronomy, 225; social dynamite, 244; study and stimulant (review), 252; the death of worlds, 263; personal, 287; the laws of brightness, 305, 324, 340, 372; geometrical problems, introduction, 332; construction, 348; analysis and synthesis, 364, 381, 397; lunar lessons, 335; the past of our earth (review), 344; star-clouds in our galaxy, 351; science as an aid to faith (review), 360; the origin of whales, 369; Mr. Proctor and the provincial press, 377; the recent solar eclipse, 384
Professor Hughes on magnetism, 339
Protective inoculation of animals, 32
Puddling furnaces in the United Kingdom in 1882, 230
Purifying air for breathing, 216
Queer fish, a, 110
Quincey, De, a dream of infinity, after Richter, 262
Railways in the United States, 32; railway investments in the United Kingdom, 48; extension of railways in America, 64; their construction in the United States, 174
Rainbow visible after sunset, 298
Rameses II., was he the Pharaoh of the oppression? Tel-el-Maskhuta *v.* the Raamses of the Bible, 21; conclusion, 36
Ranyard, A. C., on the formation of comets' tails (illustrated), 100, 292
Rational dress, 329
Recent solar eclipse, the, 384
Red spot on Jupiter, 293
Religion and men of science, 187
Respiration in mines, 216
Reviewing, remarks on, 313
Rimington, E.C., secondary batteries or accumulators, 248; energy, 192
Rings of Saturn, 118
Romanes, Dr., and Professor Asa Gray, 109
Royal Aquarium electric exhibition, the, 146; the Royal Aquarium Company and electrical exhibitors, 173
Russia, electric lighting in, 150
Salmon, Dr. D. E., on the microbe of hen-cholera, 110
Salt, the history of (review), 226
Samoyedes, the, 155
Sand-dunes, 179
Saturn, rings of, 118
Savage, the Rev. Minot J., Herbert Spencer in America, 97
Schalensteine, topographical charts in Switzerland, 126
Scheibler, Professor, and his patents for sugar making, 1
Science, the true position of, regarding supernatural religion, 109; as an aid to faith (review), 360
Scientific men and religious tests, 96
Sea, commercial products of the (review), 361
Sea-salt, our chemistry column, 353
Sea-serpent, reference to the, 110
Secondary batteries or accumulators, 248
Shilling, purchasing power of the, 188
Ship canal between Dublin and Galway, 79
Shipwrecks, statistics of, 95
Siamese monkey, behaviour of a, 109
Silvering glass, 230
Simon, Dr. Collins, a strange theory of, 243
Simoom and dust storms, 215
Skirt, the new, 162, 220
Sky, face of the, Jan. 5 to Jan. 19, 11; Jan. 19 to Feb. 2, 42; Feb. 2 to Feb. 16, 75; Feb. 16 to March 2, 105; March 2 to March 16, 134; March 16 to March 30, 166; March 30 to April 13, 197; April 13 to April 28, 226; April 27 to May 11, 253; May 11 to May 25, 282; May 25 to June 8, 312; June 8 to June 22, 346; June 22 to July 6, 379
Slack, Henry J., F.G.S., pleasant hours with the microscope, disease germs, 7, 34, 82, 114, 163, 190, 219, 245, 288, (illustrated) 322, 358, 383
Slingo, W., the central telegraph office, 220; newspaper science, 251; Professor Hughes on magnetism, 339
Slipping of locomotive wheels, prevention of, 171
Snake poisons (review), 282
Social dynamite, 244
Society of Arts and collisions at sea, 230
Solar corona, photographing the, 4
Solar eclipse, observation at San Francisco, 377; the recent, 384
Sparling, Mr. Henry, sonnet on Knowledge by, 2
Spencer, Mr. Herbert, impressions of America, 41
Spheroidal condition of liquids, 257
Spirit of turpentine from sawdust, 80
Spiritual, the natural in the (review), 312
Squirrel problem, the, 141
Standard wire gauge and the Wolverhampton Chamber of Commerce, 80
Star-clouds in our galaxy, 351
Statistics, the true use of, 18
Stays and statues, 23; in relation to strength, 50, 86; in reference to Mr. Richard A. Proctor, 343
Steel ships, tonnage of those built in 1882, 155
St. Gothard Railway and the Italian trade, 80; St. Gothard Tunnel and France, 174
Stinging tree, a, 126
Stokes, Dr., of Cambridge, 63
Storm, prediction of a, 141
Storm-waves in a still sea, 202
Stroh, Mr., and microphonic action, 230
Study and stimulant (review), 252
Sugar, new patents for making, 1
Sulphate of copper as a disinfectant, 47
Suez Canal, the, 95
Sunday Society, the, 163
Sun-god, the, and the ancient Egyptian religion, 141
Sun-views of the earth (illustrated), 24, 55, 117, 180, 237, 310, 375, 390
Sun-worship, 204
Suppression of blasphemous literature, the proposed, 156
Swan United Electric Light Company and the Russian Government, 142
Switzerland, topographical stones in, 126
Sydney and Sunday lecturing, 57
Symon, Dr. Collins, orthography of the name of, 293
Tar, how to remove it from the hands, 64
Telegraph wire struck by lightning, 230
Tel-el-Maskhuta, discoveries at, 145
Telephone for railway purposes, 32; in connection with metropolitan fires, 47; accident with a, at Sydney, New South Wales, 96; a new kind of (illustrated), 113
Telescopes, the limits of, 376
Terrible storm, prediction of, 48
Thames Embankment, the, 181
Theatres, easy egress to, 18
Thomson, Sir N., experiments of, with sunlight, moonlight, and candlelight, 47

General—*continued*.
Thought-reading, 378
Times, the, and the Rational Dress Exhibition, 330
Toad story, a, 126
Tomlinson, Charles, F.R.S., on the spheroidal condition of liquids, 257
Tornado, force of one illustrated, 2
Toy tricycle, on a, 290
Tree-planting by railway companies, 48
Tricycles, novelties in, 71; tricycles and bicycles for 1883, 98, 130, 176; with two-speed gearing, 205; of the "Sociable" type, 368
Triple-hulled steamer, a, 243
Tucchini, Professor, photographic apparatus for, 243
Tylor and views on a future state, 17
Tyndall on sound (review), 297
VANITY FAIR and Mr. Richard A. Proctor, 141
Vapours from metals, 96
Vast, the, and the minute (review), 88
Venus, alleged transit through the sun, 1
Vesuvius, photographing the spectra of eruptive flames from, 243
Victoria Institute, founding of the, 63
WALSINGHAM, Lord, on pigeon shooting, 142
Warner observatory, Rochester, N.Y. (illustrated), 232
Waste of the world's forests, 119
Watches and clocks (review), 164
Water, the colour of, 110
Water-mains for supplying London, 1
Weather-knowledge, elements of (review), 165
Weather prophecies and the *Times*, 52; forecasts and the Meteorological Office, 386
Webb, T. W., optical effects of belladonna, 68
Welland canal, the, 155
West, E. P., age of the Missouri, 327
Whales, the origin of, 369
Where to find Ferns (review), 311
Whist column: throwing away winning card of partner's suit, 15, 29; playing to the score, 45; conduct of the hand, 62; learning whist, 93; exposing a card, 93; how the skill of a whist player is shown, 139; trump-playing, 153, 170, 185, 227; the echo of a signal, 255; do you play whist? 270; see also, 77, 107, 123
Whistler, Mr., etchings of, 135, (illustrated) 208
Wiggins as a weather prophet, 215
Williams, W. Mattieu, the chemistry of cookery, 33; the boiling of water, 65; cooking under water, 97, 128, 158, 191, 218, 246, 274, 308, (illustrated) 341, 370; geology among the colliers, 328; the weather forecasts and the Meteorological Office, 386
Wilson, C. Carus, F.G.S., sand-dunes, 179
Wilson, Dr. Andrew, F.R.S.E., our bodies, muscles, 8; life and work, 39; skull and spine (illustrated), 67; the trunk and limbs, 115; the processes or functions of the body, 144; how the body's duties are performed, 178; absorption and blood repair, 204; the blood, 236; circulation of the blood, 260; the income and expenditure of the body, 306
Worlds, the death of, 263
YEAR of a naturalist, winter heliotrope, 20; gorse blossoms, 49; the peewit cries, 81; willow catkins, 112; snow-drop and snow-flake, 143; char-jump, 175; the ptarmigan, 203; the marsh marigold, 231; a geological excursion, 259; two little greenish flowers, 276; the blackcap sings, 303; among the grasses, 336; concerning bats, 367
Young men, a physician's sermon to (review), 225
Young, Professor, on a cometic collision with the sun, 79; the great comet of 1882 (illustrated), 127, 147, 160, 195
Youth, guidance for (review), 311

CORRESPONDENCE.

ACOUSTIC experiment (illustrated), 90
Ahaz, the dial of, 13, 42
Alteration in coast line, 76, 183, 299
American star bicycle, 212
Ancient inscribed stones (illustrated), 212
Ancients, optical knowledge of the, 167
Animal instincts, 269
Aphides, how to destroy them, 314
Atacama, desert of, 138
Atmospheres, a theory of, 122
Aurora Borealis, the, 13
BEAUTY, an eye for, 137
Belladonna, effects of, on the eyes, 137
Botany, vein theory in, 211
Bo-tree and the god of knowledge, 136
Brain troubles, 106
Bright star near the sun, 13
CHANCES, problem in, 332
Children, dress of, 227
Chirping spider, 69, 76, 136
Classics and religion, 167
Clear Thames, a, 168
Coast line, alteration in, 76, 183, 299
Comet, the, 59, 122; the formation of comets' tails, 152, 166, 169, 182, 267, 395; comets' tails and the surface of the sun, 395
Consanguineous marriages, 380
Corset wearing, 12; corsets, 240
Curious Christmas, a, 14
Curious rainbow (illustrated), 90
DARK suns, 106
Dead point in tricycle cranks, 169
Dentistry, electricity in, 13, 59
Desert of Atacama, 138
Dial of Ahaz, 13, 42
Discount dodge, a, 269, 314, 394
Disinfectant, a, 106
Divided skirt, the, 269, 315
Dress of children, 227
Duration of sunshine, 168
EARTHQUAKES in Westmoreland, 27
Easy multiplying, 253, 314, 348
Edelweiss, the, 90, 106
Edison Electric Light Company, 314
Electricity in dentistry, 13, 59
Enemies, waxen images of, 136
Etymology of mistletoe, 136
Evolution of life, 199
Extracting the square root, 314
Eye-piece, measuring the power of an, 12; effect of belladonna on the eye, 137; how to use the eyes, 299, 348
FELLOWSHIP of learned societies, 12
Figure conjuring, 394
Flight of vertical missile, 314, 393
Floury against waxy potatoes, 254
Formation of comets' tails, 152, 166, 169, 182, 267, 395
Fossil gum, 91
GAME, 268
Gold, value of, 167, 253
Gorse and broom, 106
Great Pyramid, the, 90, (illustrated) 267
HAMILTONIAN system, the, 210
Heat, a few observations on, 347, 380, 394
Heating power of steam, 316
How to use the eyes, 299, 348
ILLUSION, optical, 137
Interplanetary ether, 269
JOSHUA and the sun, 331
KNOWLEDGE, the god of, and the Bo-tree, 136
LANDRAILS, 380
Large sun-spot, a (illustrated), 254
Learning languages, 253
Life, evolution of, 199
Logical puzzle, 43, 60, 91, 123, 299
Longevity of the dove, 27
Luminous paint, 13
MAGIC-LANTERN slides for popular lectures, 199
Magnetic storm, 122
Measuring the power of an eye-piece, 12
Misprint, an odd, 380
Mistletoe, 90; etymology of, 136
Moon, vertex of, 168
Multiplication, 168, 253
Musical question, the, 268, 315, 394
My paradoxes, 284
NATURE, rest of, 91
New narcissus, a, 211
New paradoxer, a, 240
New skirt, the, 227
New Zealand gum, 26, 59, 211
OLDEST tree in the world, 300
Optical illusion, 137
Optical knowledge of the ancients, 167
Origin of the week, 396
Our forefathers, 89
PARADOXER, a new, 240
Phenomenon, a, 254
Planchette-writing, 136, 199
Planets, rotation of, 210
Poison in the cup, 300
Potatoes, 211
Problem in chance, 299, 332
Public right, a, 137
Purifying gas, 152
Puzzle, a, 91, 106, 123
RAINBAND spectroscope, 13, 26
Rainfall of 1882, 168
Rational dress, 182, 298, 380, 347, 393
Religion and classics, 167
Rest of nature, 91
Retrocession of the sea, 211
Rigel, 91
Rings of Saturn, 298
Rotation of planets, 210
SATURN, rings of, 210, 254, 298
Schoolgirls' problem, 183
Science and religion, 199
Sea, retrocession of the, 211
Sham thought-reading, 298
Ships in a calm, 26
Side-lights for steamers (illustrated), 183
Single eye-glasses, 227, 254
Single vision, 380
Singular phenomenon, 26; a solar phenomenon, 346
Siwalik hills, the, 314
Skirt, the divided, 269, 315
Sleet and snow, 90
Species, is there a change of? 396
Spelling reform, 284
Springs and streams, 43, 121
Square root, the extraction of the, 314
Squirrel puzzle, the, 268
Stays, 136, 169; and statues, 58, 76; and fat, 210; and health, 246
Steam, the heating power of, 316
Steamers, side-lights of (illustrated), 183
Stinging trees, 76
Stored energy, 122, 253
Stretched string, vibrations of, 167
Submerged forests, 183, 299
Sun and moon in Gibeon, 254; the sun and Joshua, 331
Sundial of Ahaz, 42, 89
Sunshine, duration of, 168
Sun-views of the earth, 59
TELESCOPES and microscopes, 121
Thames, a clear, 168
Theory of atmospheres, a, 122
Tide and weather, 267
Transit of Venus (illustrated), 90
Tree, the oldest in the world, 300
Tricycles, 182
Twenty-one school-girl puzzle, 268
VACCINATION, 395
Value of gold, 167, 253
Vein theory in botany, 211
Venus, the transit of, 13
Vertex of the moon, 168
Vertical missile, flights of, 314, 393
Vibrations of stretched string, 167
WART-CHARMING, 299, 348
Waxen images of enemies, 136
Wearing stays, 89
Weather predictions, forecasts and prophecies, 89, 122, 153, 168, 182
Week, the origin of the, 396
Westmoreland, earthquakes in, 27
Williams, Mr. Mattieu, on stays and fat, 227
Winter Rarities, 76
Wrangler, puzzle of a, 269

ANSWERS TO CORRESPONDENTS.

AURORAS not due to comets, 60
CARDINAL Newman, allusion to, 14
Civilisation and the increase of ornament, 60
Comets, how they move, 44
DALLINGER, Mr., and agnosticism, 27
Driving force of the wind, 14
EVOLUTION of light and heat and the sun, 27
GOSPEL of relaxation, 44
ICE-BOATS and their velocity, 60
KNOWLEDGE of our bodies, a proper subject for science, 14
LAPLACE and the planets, 44
PERIHELION theory of the end of the world, 14
RELAXATION, views on, 44
Religious teaching asserted to be always more or less behind the age, 14
SCIENCE and the beginning of existent things, 14
Second-hand telescopes, 60
Siemens, Mr., theory of, in relation to the sun, 27
Swift, Dean, moons of, 27

REVIEWS.

CHAPTERS on evolution, by Dr. Andrew Wilson. Chatto & Windus, 119
Clocks, watches, and bells, a rudimentary treatise on, by Sir Edmund Beckett, Bart. Crosby, Lockwood, & Co., London, 164
Commercial products of the sea; or, marine contributions to food, industry, and art, by P. L. Simmonds. London: Griffith & Farran, 361
ELECTRIC illumination, by Conrad Cooke, James Dredge, Mr. F. O'Reilly, S. P. Thompson, and H. Vivarey. Vol. I. London: offices of *Engineering*, 74
Electric light, the; its production and use, by J. W. Urquhart, electrician, edited by F. C. Webb, M.I.C.E. Second edition. London: Crosby, Lockwood, & Co., 378
Elementary meteorology, by Robert H. Scott, with numerous illustrations. Kegan Paul & Co., London, 165
Engineering geology, by W. H. Penning, F.G.S., geologist, Government survey of England and Wales. London: Baillière, Tindall, & Cox, 311
Evolution, chapters on, by Dr. Andrew Wilson. Chatto & Windus, 119
FERNS, where to find them, with a special chapter on the ferns round London, by Francis Heath, editor of *Forestry*. Sampson Low, Marston, & Co., London, 311
Field geology, a text-book of, by W. H. Penning, F.G.S., with a section on palæontology, by A. J. Jukes-Browne, F.G.S. London: Baillière, Tindall, & Cox, 311
HEAVENLY bodies, the; their nature and habitability, by William Miller, F.S.C. London: Hodder & Stoughton, 361
INDIAN snake poisons, their nature and effects, by A. J. Wall, M.D. W. H. Allen & Co., London, 282
LANTERN readings, the voyage of the "Challenger," by W. Lant Carpenter, B.A. Alabaster, Passmore, & Co., London, 378
Leopold Shakespeare, the, 209
Library of English literature, 209
MINERAL waters of Europe, the, including a short description of artificial mineral waters, by C. R. C. Tichborne, LL.D., and Professor James, M.D. London: Baillière, Tindall, & Cox, 345
NAT the naturalist; or, a boy's adventures in the Eastern seas. By George Manville Fenn. Blackie & Son, 10
Natural law in the spiritual world, by Henry Drummond, F.R.S.E. London: Hodder & Stoughton, 312
Natural philosophy, the new principles of, by William Leighton Jordan, F.R.G.S. London: David Bogue, 312

XUM

Reviews—*continued.*
Natural philosophy, a treatise on, by Professors Sir W. Thomson and P. G. Tait. Vol. I., part 2. Cambridge University Press, 344
Organic chemistry, an introduction to, by Adolph Pinner, Ph.D., Professor of Chemistry in the University of Berlin. Translated and revised from the fifth German edition by Peter T. Austin, Ph.D., Professor of Chemistry. London: Trübner & Co., 345
Physical Optics, by R. T. Glazebrook, M.A. Longmans Green, & Co., 10
Poems and ballads for penny readings, by Agra. Wyman & Sons, London, 345
Popular astronomy, by Simon Newcomb, LL.D., of the Naval Observatory, Washington. Messrs. Macmillan & Co., London, 225
Practical geometry, the art-student's, second grade, by John Lowres, revised and partly written by George Brown, of the Blackheath School of Art. London; Moffat & Paige, 266
Salt, the history of, by Evan M. Boddy, M.R.C.S. Baillière, Tindall, & Cox, London, 226
Science, does it aid faith in regard to creation? by the Right Rev. Henry Cotterill, D.D., F.R.S.E., Bishop of Edinburgh. London: Hodder & Stoughton, 360
Snakes; curiosities and wonders of serpent life, by Catherine C. Hopley. Griffith & Farran, London, 133
Sound, by John Tyndall, D.C.L., &c. Fourth edition, revised and augmented. London: Longmans & Co., 297
Study and stimulant; or, the use of narcotics and intoxicants in relation to intellectual life, edited by A. Arthur Reade. Abel Heywood & Son, Manchester, 252
Universe, the, or the infinitely great and the infinitely little, by F. A. Pouchet, M.D. London: Blackie & Son, 88
Young men, a physician's sermon to, by Dr. William Pratt. Baillière, Tindall, & Cox, London, 225
Youth, business guide for the, a practical manual for those entering life, by Experientia. London: Wyman & Sons, 311

MISCELLANEOUS.

Alloys of metals, 379
Amsterdam, the exhibition at, 209
Arcade railway under Broadway, New York, 378
Asbestos rope, 161
Australian meat and British butchers, 151
Balloons, new electrical motor for, 266
Boston, the telephone in, 266
Brass cannon found at Coorum, 258
Brighton School of Science and Art, 386
Burnham Beeches, 368
Cancelling stamp, a new electric, 362
Capybara (a rodent), the, and its relations to cats, 331
Caterpillars, train stopped by, 374
Chesterfield, electric lighting at, 307
China, the great wall of, 171
Chubb & Sons, enormous safe manufactured by, 138
Coal brought to London, 69
Coalfield, development of the Deer Creek, in Arizona, 312
Coleridge, Lord, summing-up of, in the *Freethinker* trial, 279
Colonies, the increasing importance of, 209
Colossal bronze statue, 378
Colour-blindness and railway employés, 275
Courtney, Mr., on science, 41
Creosoted trestle work, remarkable specimen of, 387
Cunning of a toad, 73
Cyclone at Beauregard and Wesson, Mississippi, 283
Devotion to literature of the English people, 198
Electric light in the City of London, 41; in Switzerland, 194
Electric lighting, 84; application for orders relative to, 151; lighting in Kimberley, South Africa, 262; at Chesterfield, 307
Engineering and metal trades' exhibition, 40
Explosives, statistics of manufactories of, 374
Extraordinary run of an engine, 235
Fatalities to railway servants, 293
Ferric oxalate, the photo-chemical action of, 261
Fiddlestrings, the manufacture of, 356
Fish carried alive by railway, 275
Foretelling firedamp escapes, 297
France, telegraphic wire in, 360
Free smoke abatement museum, 153
Front-steering tricycle, a, 151
Gas *v.* electricity, 123
Gas-well at Lyons, 374
Giants' Causeway and Port Rush electrical tramway, 69
Glasgow, the electric clocks in, 266
Glass, electrical resistance of, 72
Gold in Australia, 251; abundance of, 329
Gramme Electric Company of New York, patents controlled by, 25
Great wall of China, 171
Hartz mountains, mining work in the, 387
Hydrants for fire purpose, mileage of streets with, 378
Ice at the Pole, 212
Ice gorge on St. Lawrence River broken by gunpowder mine, 378
Insects, agency of, in fertilising flowers, 185
Iron, production of the different kinds in the United Kingdom, 263
Japan tramways, 358
Killed by stays, 283
Kimberley, South Africa, electric lighting in, 262
Kirkcaldy Naturalists' Society, 286
Lake Winnipeg, 309
Liquorice farming in New Zealand, 166
Literature, devotion to, of the English people, 188
Logic, study of, 71
London Library, utility of the, 135
Long-lived lamp, a, 392
March, extraordinary cold of, 212
Matter diffused in the air, 379
Maxim-Weston Electric Light Company, 286
Messina, steel bridge for the Strait of, 309
Mexican tin, 374
Mid-ocean telegraphy, 331
Mining work in the Hartz mountains, 387
Narrow gauge trains blown off rails, 369
New spectrometer, a, 297
New Zealand mutton and beef, 151
Nitrogen, the liquefaction of, 309
Non-inflammable insulating material, 260
Nottingham, electric lighting at, 283
Oil tanks fired by lightning, 307
Paper wheels for railway trains, 374
Perry, Professor, on electricity, 133
Philadelphia, its telegraphic, telephonic, and electric light revenue, 153
Pintsch Patent Lighting Company and the Suez Canal, 283
Poteline, a new substance, 105
Prize competition for railway inventions, 258
Prize electrical essay, 88
Proctor, Mr., and his lectures at St. Leonards, 331
Radiation of silver in solidifying, 312
Railway coupling stick, advantage of, 374
Railway mileage of the world, 392
Railway servants, fatalities to, 293
Red marl, discovery of a bed of, at Ruabon, 392
Roman coins, discovery of, at Cobham Hall, near Rochester, 283
Royal National Lifeboat Institution, 214
Sanitary Inspection Association, the, 133
Shanghai, the foreign settlement at, 85
Sheppey, landslip in the Isle of, 374
Silver, radiation of, in solidifying, 312
Snow-plough in India, 260
Spanish iron minerals, 236
Spectrometer, a new, 297
Sporting shot manufactured from iron, 386
South American timber, 392
Steel bridge for the Strait of Messina, 309
Storing electrical enery, new patent for, by Mr. C. F. Brush, 138
Street fire alarms, 85
Suez Canal, lighting the, by gas, 283
Telegrams between Australia and England, average time of transmission, 263
Telegraph in British Guiana, 25
Telegraphic wire in France, 360
Telegraphy in China, 328
Telephone, statistics of, 202; in Boston, 266
Thunderstorm, 88
Time signalling, 359
Tissandier, Mr. M. G., and his new electrical motor for balloons, 266
Toad, cunning of a, 73
Torrens Bridge (South Australia), sinking of the, 336
Trafalgar collieries, Forest of Dean, electrical experiments in, 25
Tramways in Japan, 358
Trans-Caucasian railway, working of, 71
Travellers' meteorological equipment, 123
Tunnel-work, a difficult piece of, 388
Turkish railroads and their peculiar freights, 57
Unsettled area of the United States, 309
Ventilation of the Metropolitan District Railway, 153
Wind pressure on the Forth bridge, 40
Wood as fuel, statistics of, 306
Yacht, a large steam, 251
Zinc coating for iron, 305

ILLUSTRATIONS.

Acoustic experiment, 90
Age of the moon, 294
Amateur electrician, the, electrical measurements, 238
Amœba, diagrammatic drawings of, 355
Ancient inscribed stones, 212
Archer fish, the, 280
Armature of the Brush dynamo-electric machine, 295, 296
Atlas and Hercules (walled plains in the moon), 294
Bower-Griscom lamp, 264
Brachionus urceolaris (vegetable organism), 359
Cathbrine, Cyrillus, and Theophilus (lunar craters), 294
Comets, heads of, 148
Crystal Palace electric and gas exhibition, 196
Curious rainbow, a, 90
Electrical measurement, 102, 103, 206, 207
Etchings of Mr. Whistler, 208
Eurypharynx pelecanoides, the, 250
Eye, diagrams of the, 111
Formation of comets' tails, 102
Formations in the moon, views of, 326
Fracastorius (bay in the moon), 294
Gastroscope, view showing application of, 281
Geological sketch-map of the Isle of Man, 277
Great Britain, sun-views of, 390
Great comet of 1882, the, 102, 128, 195
Great Pyramid, sections of ventilation of, 267
Heads of comets, 148
How to use our eyes, 194
Large sun-spot, a, 254
Laws of brightness, diagrams illustrative of the, 304
Leech, John, a reminiscence of, 209
Lunar craters, various views of, 294
Moon, map of the, 222
Nights with a three-inch telescope, 39
Œcistes crystallinus (vegetable organism), 359
Organisms revealed by the microscope, 322
Our bodies, the human skeleton, 116
Paradise fish, the, 291
Petavius, a typical lunar feature, 265
Protamœbæ, figure of, from infusion of meat, 355
Reading, right and wrong ways in regard to the eye-sight, 149, 150
Resistance boxes (the amateur electrician), 70
Roaster, by Count Rumford (chemistry of cookery), 342
Rotifer vulgaris (vegetable organism), 358
Skiddaw slates, section, Isle of Man, showing the conglomerate resting thereon, 278
Skull, diagram of a, 64
Steamers, side-lights of, 183
Strata, geological, of the Isle of Man, 278
Sun-views of the earth, 24, 55, 117, 180, 237, 310, 375, of Great Britain, 390
Telephone, diagrams of, 113, 114
Telescope in the Warner Observatory, 233
Transit of Venus, 90
Valley of the Alps (views in the moon), 391
Voluntary muscles, 9
Warner Observatory, the, 232